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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,773	07/31/2003	Takayuki Yogo	056208.52613US	8467
23911	7590	09/22/2005	EXAMINER	
CROWELL & MORING LLP INTELLECTUAL PROPERTY GROUP P.O. BOX 14300 WASHINGTON, DC 20044-4300			WILLIAMS, ALEXANDER O	
			ART UNIT	PAPER NUMBER
			2826	

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/630,773

Applicant(s)

YOGO ET AL.

Examiner

Alexander O. Williams

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-22, 24 and 25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 18-22, 24 and 25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

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Serial Number: 10/630773 Attorney's Docket #: 740819-982

Filing Date: 7/31/2003; claimed foreign priority to 8/1/2002

Applicant: Yogo et al.

Examiner: Alexander Williams

Applicant's RCE/Amendment filed 9/8/05 to the election of species of figure 6 (formerly claims 1, 2 and 6-17), filed 9/9/04, has been acknowledged.

Claims 1-17 and 23 have been canceled.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the claimed language of claims 18-22, 24 and 25 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New

Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claims 18 to 22, 24 and 25 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 18 and 19, it is unclear and confusing to what is meant by "said electronic elements and said insulating overcoat comprise films formed according to **thick film technology**." What and how does "thick film technology" relate to the structure of this device? Where and how is this structure shown in the drawing?

In claim 24, the phrase "the conductor wire" lack antecedent basis. Should this now be --the conductor wire films--? Where and how in the elected species was figure 6 is this structure shown in the drawing?

In claim 25, line 8 and line 9 the phrase "the conductor wires" lack antecedent basis. Should this now be --the conductor wire films--? Where and how in the elected species was figure 6 is this structure shown in the drawing?

Any of claims 18 to 22, 24 and 25 not specifically addressed above are rejected as being dependent on one or more of the claims which have been specifically objected to above.

For example, the elected species was figure 6 in which a resistor, not a conductor, is claimed. Where is this structure shown in the drawings?

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 18 to 22, 24 and 25, insofar as they can be understood, are rejected under 35 U.S.C. 102(b) as being anticipated by Dedert et al. (U.S. Patent # 6,142,018). 18. Dedert et al. (figures 1 to 6) specifically figures 1 and 2 show an electronic device containing in a case member which is disposed in an air cleaner or an air duct of an automobile, comprising: a substrate **110** having electronic elements mounted thereon, and conductor wire films **120,122,124** made of silver or silver alloys, the conductor wire

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films being connected to the elements; an insulating overcoat film **130,132,134** made of a material selected from the group consisting of glass and resin covering the surface of the device, including the conductor wire films; wherein, the overcoat has openings through which surfaces of the conductor wire films are exposed; the openings are formed in a shape having no square corners and no acute angle corners; the entire exposed surfaces of the conductor wire films are covered with a solder wire films are protected from any corrosive gas that may enter the case member; and said electronic elements and said insulating overcoat comprise films formed according to thick film technology.

19. Dedert (figures 1 to 6) specifically figures 1 and 2 show an electronic device disposed in a case member placed in an air duct, comprising: a substrate **110** having conductor wire films **120,122,124** made of silver or silver alloys and electronic elements mounted thereon, said electronic elements including at least one element selected from the group consisting of **resistors**, capacitors, inductors, and diodes, the conductor wire films being connected to the at least one element; and an insulating overcoat film **130,132,134** made of a material selected from the group consisting of glass and resin covering the surface of the device, including the conductor wire films; wherein the overcoat has openings through which surfaces of the conductor wire film are exposed; the openings are formed in a shape having no square corners and no acute angle corners; the entire exposed surfaces of the conductor wire films are covered with a solder whose main component is tin, whereby the exposed surface of the conductor wire films are protected from any corrosive gas that may enter the case member; and said electronic elements and said insulating overcoat comprises film formed according to thick film technology.

20. The electronic device according to Claim 18, Dedert show wherein the openings have a shape that is selected from the group consisting of a **round**, elliptical, rectangular with round corners, and rectangular with chamfered corners.

21. The electronic device according to Claim 18, Dedert show wherein the openings are covered with a conductive metal paste (cermet paste).

22. The electronic device according to Claim 18, Masuda show wherein the substrate has at least two layers **140**.

24. Dedert (figures 1 to 6) specifically figures 1 and 2 show an electronic device for a case member disposed in an air duct of an automobile, comprising: a substrate **110** having a conductor wire films **120,122,124** made of silver or a silver alloy mounted thereon; and an insulating overcoat film **130,132,134** made of an insulating material covering the conductor wire film; wherein the overcoat has an opening having no acute angle corner wherein a surface of the conductor wire (films) is exposed though an opening formed in the overcoat; and the surface of the exposed conductor wire film is covered with a solder whose main component is tin.

25. Dedert (figures 1 to 6) specifically figures 1 and 2 show an electronic device for a case member disposed in an air duct of an automobile, comprising: a substrate **110** having a resistor film mounted thereon, the resistor having conductor wire films **120,122,124** and terminals **8,7** connected thereto; and an overcoat film **130,132,134** made of an insulator covering the resistor the conductor wire films and the terminals; wherein, the overcoat film has an opening formed in a shape having no acute angle corners wherein a surface of the conductor wire (films) is exposed; and the exposed surface of the conductor wire (films) is covered with a solder **2** whose main component is tin.

US-PAT-NO: 6142018

ABSTRACT:

A variable resistor useful for automotive type fuel senders has a cermet film fired upon a refractory substrate. The cermet film is burnished to reduce asperity of the fired film. The resulting resistor element works with existing mechanical float type senders to provide a reliable and long lasting sender.

(1) BACKGROUND OF THE INVENTION

(2) 1. Field of the Invention

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(3) This invention pertains generally to measuring and testing, and more particularly to measuring liquid levels using a float and sensor. The measuring apparatus is preferably used to detect fuel levels within a receptacle such as a fuel tank.

(4) 2. Description of the Related Art

(5) Fuel level sensors typically found in automobiles provide many challenges to a designer trying to achieve enduring performance. Among the challenges are factors specific to the automotive environment, such as high vibration, frequent cycling including simple sloshing of fuel within a tank, and widely varying operating temperatures. Other challenging factors are specific to the automotive fuel system, primarily derived from the sender being exposed to a wide variety of fuels and additives. For example, both gasoline and alcohol are generally effective at dissolving grease compounds and lubricants, thereby preventing a designer from incorporating lubricants into the sender. Both gasoline and alcohol will also cause swelling in many plastic materials. Detergents are also generally a part of automotive fuels, once again preventing any incorporation of grease or lubricant. Off-the-shelf gasoline additives often include very powerful cleaners and solvating agents for purposes such as fuel varnish removal. These cleaners and solvating agents will also attack various plastics and remove grease and lubricants. Finally, challenges exist for the designer which are common to resistive type sensors in general, such as variations in contact resistance, wear, and corrosion. Each of these challenges tend to reduce the effective life of the sender and limit options available to a designer.

(6) In recognition of the unusually harsh automotive fuel environment, the use of lubricants which is traditional in other resistive or contacting sensor environments is impractical. Furthermore, polymer-bound resistive compositions are susceptible to fuel components and fuel additives, and have therefore also proved to be unacceptable. As a result, cermet materials which are formed from glasses, ceramics, conductive metals and screening agents are the materials of choice for fuel senders. Cermet resistors are typically formed from either ruthenium dioxide or silver-palladium compositions that are mixed or compounded with specialty glasses. Often, the cermet conductors are formed from silver or silver-palladium conductors, also mixed or compounded with specialty glasses.

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The specialty glasses will frequently include significant amounts of aluminum oxide and silica, both which are known to form hard and potentially very abrasive glass compositions. The compositions are typically screen printed onto a refractory substrate such as aluminum oxide, and then fired at very elevated temperatures, often in the range of six hundred to one thousand degrees Centigrade. At the elevated temperatures, the specialty glasses will begin to reflow and sinter, as will the precious metal particles. The screening agents pyrolytically decompose, leaving little or no residue. Eventually a conductive network is formed within the cermet material, and, most preferably, the glass forms an adhesive bond with both the substrate and the metal particles. Important to note, however, is the fact that neither the glass or the metal will actually be fully molten. Rather, the sintering process involves a surface energy phenomenon wherein smaller particles tend to unite to form larger, usually very non-spherical masses. These cermet materials offer much advantage in stability and chemical resistance, being very nearly inert with regard to the fuel components. Furthermore, the cermet materials are very hard, thereby reducing wear of the resistor material during the large number of cycles required in an automotive fuel sender. To address contact resistance issues, the resistor element is frequently patterned with or segmented by conductor stripes or dots. The contactor, instead of sliding over and contacting relatively high resistance materials, is able to contact low resistance materials which thereby tend to lower contact resistance and contact resistance variations. Furthermore, by using the low resistance material for a contact surface, wear does not change the sensed output measurably.

6) The method used to realize the benefit of the present invention is shown in FIG. 6, wherein a cermet paste is applied in step 610 to a refractory substrate. The cermet paste is fired at step 620, and then burnished at step 630. Integrated directly with step 630, or provided separately, depending upon the specific method of burnishing chosen for step 630, there will preferably be cleaning to remove debris. In the preferred embodiment, cleaning is accomplished with a stream of compressed air. The sender is then assembled in step 640, ready to be placed into service. As is apparent, no unusual or extraordinary steps are required other than the burnishing step 630. In addition, burnishing has been determined to benefit solderability of the conductors, providing further synergistic advantage over the prior art. Easier solder wetting improves initial manufacturing yields during the soldering step,

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thereby reducing solder rework and reducing assembly cost.

(7) Unfortunately, in spite of the many advantages inherent in cermet compositions and conductor stripes, automotive fuel senders continue to be plagued by early failures. Conductive traces are worn from the alumina substrates, resulting in poor or completely failed electrical contact and elevated resistance readings. Events of poor or lost electrical connection may be sensed by the engine computer signalling a service engine light, or may trigger inaccurate or erratic fuel level measurements.

(8) As a result of the continuing difficulties, a number of efforts have been made to improve fuel level sensors and thereby extend operational life. One such example is illustrated in U.S. Pat. No. 5,169,465 to Riley, incorporated herein by reference. Therein, a process is disclosed for forming a relatively smooth layer of glass between stripes of conductive material. Riley achieves this by sinking a cermet conductive material into a glass dielectric layer during sintering. While this process was initially believed to offer a solution to extended life, the full benefit originally conceived was, in practice, never actually achieved.

(10) These prior art senders are illustrated in FIGS. 1 and 2 by exaggerated cross-section, wherein a sender 100 includes a resistor substrate 110 having patterned thereon thick film cermet conductors 120, 122, 124 which include microscopically rough surfaces 130, 132, 134. Surfaces 130, 132 and 134 may be formed from the same cermet material as base conductors 120, 122, 124, or, as is known in the prior art, these surfaces 130, 132, 134 may be a different composition. Sliding over surfaces 130, 132, 134 and dropping partially towards substrate 110 at gaps 112 and 114 is contactor 140. While contactor 140 is illustrated as a rake in FIG. 1, it will be apparent to those of ordinary skill that there are a wide variety of contactor geometries available in the art and the rake geometry illustrated in FIG. 1 is purely for exemplary purposes. As aforementioned in the Riley patent, the phenomenon which was believed to damage the variable resistor was the undulating, up and down motion shown by line 150 which represents the vertical travel of contactor 140 as contactor 140 is passed horizontally over a length of substrate 110. In the Riley patent the undulation of line 150 was reduced by forming a continuous

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glass layer and sinking conductives 120, 122 124 into the glass layer. Unfortunately, and as aforementioned, this did not provide the desired solution. By further magnifying a single trace in prior art FIG. 2, the surface valleys such as valley 131 and surface peaks such as 133 are more apparent. The difference between the peaks and valleys may be represented by the dimension $R_{sub.a}$, representative of surface finish, illustrated in FIG. 2. It has been determined by the present inventors, as will more fully be described hereinbelow, that the failure mechanism is not the undulation of contactor 140 illustrated by line 150, but instead is a result of the microscopic surface roughness represented by $R_{sub.a}$.

Initially, it is noted that the 35 U.S.C. § 103 rejection based on the substrate having at least two layers deals with an issue (i.e., the integration of multiple pieces into one piece or conversely, using multiple pieces in replacing a single piece) that has been previously decided by the courts.

In Howard v. Detroit Stove Works 150 U.S. 164 (1893), the Court held, "it involves no invention to cast in one piece an article which has formerly been cast in two pieces and put together...."

In In re Larson 144 USPQ 347 (CCPA 1965), the term "integral" did not define over a multi-piece structure secured as a single unit. More importantly, the court went further and stated, "we are inclined to agree with the solicitor that the use of a one-piece construction instead of the [multi-piece] structure disclosed in Tuttle et al. would be merely a matter of obvious engineering choice" (bracketed material added). The court cited In re Fridolph for support.

In re Fridolph 135 USPQ 319 (CCPA 1962) deals with submitted affidavits relating to this issue. The underlying issue in In re Fridolph was related to the end result of making a multi-piece structure into a one-piece structure. Generally, favorable patentable weight was accorded if the one-piece structure yielded results not expected from the modification of the two-piece structure into a single piece structure.

Claim 22, **insofar as claim 22 can be understood**, is rejected under 35 U.S.C. § 103(a) as being unpatentable over Dedert et al.(U.S. Patent # 6,142,018).

22. The electronic device according to Claim 18, Dedert et al. show wherein the substrate has at least two layers **110**.

Therefore, it would have been obvious to one of ordinary skill in the art to use the substrate having at least two layers as "merely a matter of obvious engineering choice" as set forth in the above case law.

Response

Applicant's arguments filed 9/8/05 have been fully considered, but are moot in view of the new grounds of rejections detailed above.

The listed references are cited as of interest to this application, but not applied at this time.

Field of Search	Date
U.S. Class and subclass: 257/48,620,686,685,723,777,528,532	11/18/04 6/4/05 9/19/05
Other Documentation: foreign patents and literature in 257/48,620,686,685,723,777,528,532	11/18/04 6/4/05 9/19/05
Electronic data base(s): U.S. Patents EAST	11/18/04 6/4/05 9/19/05

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander O Williams whose telephone number is (571) 272 1924. The examiner can normally be reached on M-F 6:30AM -7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nathan Flynn can be reached on (571) 272 1915. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink, appearing to read 'Alexander O Williams', with a large, stylized flourish extending upwards and to the right.

Alexander O Williams
Primary Examiner
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AOW
9/19/05